

CLAIMS

WHAT IS CLAIMED IS:

- 1        1.    An active/adaptive actuator for an adaptive optic  
2 mirror comprising:
  - 3            A.    A case mounted next to said adaptive optic  
4 mirror;
  - 5            B.    a holding plate with a preset plurality of  
6 openings rigidly mounted within said case;
  - 7            C.    a calibration mounting plate rigidly placed in  
8 said case such that said holding plate is between said  
9 calibration mounting plate and said adaptive optic mirror, said  
10 calibration mounting plate having a plurality of openings  
11 matching in number those in said holding plate and axially  
12 aligned with said openings in said holding plate;
  - 13           D.    a plurality of support collars, one each mounted  
14 in each of said openings in said holding plate;
  - 15           E.    a plurality of differential threads, one each  
16 threaded into each of said support collars;
  - 17           F.    a plurality of actuator holders one each threaded  
18 into each of said differential threads;
  - 19           G.    a plurality of actuators, one each mounted to  
20 each of said actuator holders and operably connected to said  
21 adaptive optic mirror;

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22           H.    a first adjustment handle which fits through said  
23 openings in said calibration mounting plate such that it  
24 operably connects to said support collars, one at a time, so as  
25 to turn said support collars; and

26           I.    a second adjustment handle which is inserted  
27 through said first adjustment handle so it operably connects to  
28 said differential thread while said first adjustment handle is  
29 operable connected to the support collar threaded to said  
30 differential thread so as to turn said differential thread  
31 independently of turns to said support collar.

1           2.    An active/adaptive actuator for an adaptive optic  
2 mirror as described in Claim 1 further comprising said case,  
3 holding plate, and calibration mounting plate all made of  
4 cyanate ester composites with matching coefficients of thermal  
5 expansion.

1           3.    An active/adaptive actuator for an adaptive optic  
2 mirror as described in Claim 1 where said actuators are mounted  
3 between two push-pull rods to connect each actuator to its  
4 respective actuator holder and to said adaptive optic mirror.

1           4.           An active/adaptive actuator for an adaptive optic  
2 mirror as described in Claim 2 where said actuators are mounted  
3 between two push-pull rods to connect each actuator to its  
4 respective actuator holder and to said adaptive optic mirror.

1           5.           An active/adaptive actuator for an adaptive optic  
2 mirror as described in Claim 1 further comprising said case,  
3 holding plate, and calibration mounting plate all made of  
4 carbon-silicon-carbon composites with matching coefficients of  
5 thermal expansion.

1           6.           An active/adaptive actuator for an adaptive optic  
2 mirror as described in Claim 5 where said actuators are mounted  
3 between two push-pull rods to connect each actuator to its  
4 respective actuator holder and to said adaptive optic mirror.

1           7.           An active/adaptive actuator for an adaptive optic  
2 mirror as described in Claim 1 wherein each of said plurality of  
3 actuators comprises two piezoelectric plates electrically  
4 connected in parallel and having a silicon rubber o-ring  
5 separating them.

1           8.    An active/adaptive actuator for an adaptive optic  
2 mirror as described in Claim 2 wherein each of said plurality of  
3 actuators comprises two piezoelectric plates electrically  
4 connected in parallel and having a silicon rubber o-ring  
5 separating them.

1           9.    An active/adaptive actuator for an adaptive optic  
2 mirror as described in Claim 3 wherein each of said plurality of  
3 actuators comprises two piezoelectric plates electrically  
4 connected in parallel and having a silicon rubber o-ring  
5 separating them.

1           10.   An active/adaptive actuator for an adaptive optic  
2 mirror as described in Claim 4 wherein each of said plurality of  
3 actuators comprises two piezoelectric plates electrically  
4 connected in parallel and having a silicon rubber o-ring  
5 separating them.

1           11.   An active/adaptive actuator for an adaptive optic  
2 mirror as described in Claim 5 wherein each of said plurality of  
3 actuators comprises two piezoelectric plates electrically  
4 connected in parallel and having a silicon rubber o-ring  
5 separating them.

6           12. An active/adaptive actuator for an adaptive optic  
7 mirror as described in Claim 6 wherein each of said plurality of  
8 actuators comprises two piezoelectric plates electrically  
9 connected in parallel and having a silicon rubber o-ring  
10 separating them.

1           13. An active/adaptive actuator for an adaptive optic  
2 mirror comprising:

3           A. A case mounted next to said adaptive optic  
4 mirror;

5           B. a holding plate with a preset plurality of  
6 openings rigidly mounted within said case;

7           C. a calibration mounting plate rigidly placed in  
8 said case such that said holding plate is between said  
9 calibration mounting plate and said adaptive optic mirror, said  
10 calibration mounting plate having a plurality of openings  
11 matching in number those in said holding plate and axially  
12 aligned with said openings in said holding plate;

13           D. a plurality of support collars, one each rigidly  
14 mounted in each of said openings in said holding plate;

15           E. a plurality of differential threads, one each  
16 threaded into each of said support collars;

17           F.    a plurality of actuator holders one each threaded  
18 into each of said differential threads;

19           G.    a plurality of actuators, one each mounted to  
20 each of said actuator holders and operably connected to said  
21 adaptive optic mirror;

22           H.    a plurality of first adjustment handles, one each  
23 connected to said differential threads so said differential  
24 thread may be screwed through a rigidly mounted support collar;  
25 and

26           I.    a plurality of second adjustment handles, one  
27 each connected to each of said actuator holders such that said  
28 actuator holder may be screwed through said differential thread.

1           14.   An active/adaptive actuator for an adaptive optic  
2 mirror as described in Claim 13 further comprising said case,  
3 holding plate, and calibration mounting plate all made of  
4 cyanate ester composites with matching coefficients of thermal  
5 expansion.

1           15.   An active/adaptive actuator for an adaptive optic  
2 mirror as described in Claim 13 where said actuators are mounted  
3 between two push-pull rods to connect each actuator to its  
4 respective actuator holder and to said adaptive optic mirror.

5        16. An active/adaptive actuator for an adaptive optic  
6 mirror as described in Claim 14 where said actuators are mounted  
7 between two push-pull rods to connect each actuator to its  
8 respective actuator holder and to said adaptive optic mirror.

1        17. An active/adaptive actuator for an adaptive optic  
2 mirror as described in Claim 13 further comprising said case,  
3 holding plate, and calibration mounting plate all made of  
4 carbon-silicon-carbon composites with matching coefficients of  
5 thermal expansion.

1        18. An active/adaptive actuator for an adaptive optic  
2 mirror as described in Claim 14 where said actuators are mounted  
3 between two push-pull rods to connect each actuator to its  
4 respective actuator holder and to said adaptive optic mirror.

1        19. An active/adaptive actuator for an adaptive optic  
2 mirror as described in Claim 13 wherein each of said plurality  
3 of actuators comprises two piezoelectric plates electrically  
4 connected in parallel and having a silicon rubber o-ring  
5 separating them.

1        20. An active/adaptive actuator for an adaptive optic  
2 mirror as described in Claim 14 wherein each of said plurality  
3 of actuators comprises two piezoelectric plates electrically  
4 connected in parallel and having a silicon rubber o-ring  
5 separating them.

1        21. An active/adaptive actuator for an adaptive optic  
2 mirror as described in Claim 15 wherein each of said plurality  
3 of actuators comprises two piezoelectric plates electrically  
4 connected in parallel and having a silicon rubber o-ring  
5 separating them.

1        22. An active/adaptive actuator for an adaptive optic  
2 mirror as described in Claim 16 wherein each of said plurality  
3 of actuators comprises two piezoelectric plates electrically  
4 connected in parallel and having a silicon rubber o-ring  
5 separating them.

1        23. An active/adaptive actuator for an adaptive optic  
2 mirror as described in Claim 17 wherein each of said plurality  
3 of actuators comprises two piezoelectric plates electrically  
4 connected in parallel and having a silicon rubber o-ring  
5 separating them.



6           24. An active/adaptive actuator for an adaptive optic  
7 mirror as described in Claim 18 wherein each of said plurality  
8 of actuators comprises two piezoelectric plates electrically  
9 connected in parallel and having a silicon rubber o-ring  
10 separating them.

1           25. An actuator comprising a piezoelectric plate with a  
2 base material coated with a piezoelectric coating such that when  
3 a voltage is applied across said base and said coating that said  
4 piezoelectric plate may bend as a bimetallic strip.

1           26. An actuator for low voltage use comprising:

2           A. Two piezoelectric plates electrically connected  
3 in parallel, and

4           B. a silicon rubber o-ring placed between said two  
5 piezoelectric plates such that two piezoelectric plates may bow  
6 towards one another as well as away from one another depending  
7 on the voltage applied to them.